Cowpea Seed Systems and Dissemination of Seed of Improved Varieties in West Africa

Ndiaga Cisse, Issa Drabo, I. Baoua, M. Toure, Jeff Ehlers and Philip Roberts (PI)

Modern Cowpea Breeding to Overcome Critical Production Constraints in Africa
Why is a Certified Seed system important?

- A good crop starts with good seed
- Provides a pathway for delivery of pure and high quality seed to farmers
- For new and existing varieties
- Ensures ‘trueness-to-type’
  - Seed stocks get mixed over time
    - mechanical mixing
    - outcrossing
- High germination and vigor
- Freedom from seed borne diseases
Seeds are different than most other products

• Appearance says little about what you are getting
  ➢ Germination, vigor, physical and trait characteristics

• Farmer saved seed
  ➢ Little control of genetic purity and freedom from seed-borne diseases
  ➢ Storage conditions variable

• Market bought seed
  ➢ Even worse
  ➢ Low germination, vigor
  ➢ Wrong/mixed variety
  ➢ Seed-borne diseases
Variety Release, Breeders Seed

Essentially 100% pure, Produced by breeder

Purity monitored by Foundation Seed Programs, etc

Foundation Seed

(Registered Class)

Purity monitored by Certifying Agency, large scale multiplication

Certified Seed

Enough to meet farmer demand

Foundation to Foundation

Certified Seed Pathway to Farmers

Farmers
Seed Systems in Selected Countries

• Diverse models can work
  – as long as it delivers seed to farmers

• Angola
  – No formal system for cowpea yet

• Senegal and Burkina Faso
  – Breeders seed produced by ISRA and INERA
  – Issa Drabo – INERA Burkina Faso
  – Phil Roberts for Ndiaga Cisse of ISRA, Senegal
Overview of cowpea seed supply system in Burkina Faso
Some of the important people of the Burkina Cowpea Team
Cowpea production increasing

EVOLUTION OF COWPEA PRODUCTION IN BURKINA FASO 2001 to 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (Tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>376,225</td>
</tr>
<tr>
<td>2002</td>
<td>330,210</td>
</tr>
<tr>
<td>2003</td>
<td>456,600</td>
</tr>
<tr>
<td>2004</td>
<td>276,349</td>
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<tr>
<td>2005</td>
<td>444,712</td>
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<tr>
<td>2006</td>
<td>436,156</td>
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<td>2007</td>
<td>253,190</td>
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<tr>
<td>2008</td>
<td>537,680</td>
</tr>
<tr>
<td>2009</td>
<td>453,629</td>
</tr>
<tr>
<td>2010</td>
<td>626,113</td>
</tr>
</tbody>
</table>
Découpage administratif du Burkina en province

Sites of Foundation and Certified Seed Production, Training for both classes
<table>
<thead>
<tr>
<th>Varieties</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tbody>
<tr>
<td>KVX 396-4-5-2-D</td>
<td>0.189</td>
<td>0.481</td>
<td>0.328</td>
<td>0.279</td>
<td>0.844</td>
<td>1.408</td>
</tr>
<tr>
<td>KVX 396-4-4</td>
<td></td>
<td>0.045</td>
<td>0.317</td>
<td>0.060</td>
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<td>0.115</td>
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<tr>
<td>KVX 414-22-2</td>
<td>0.088</td>
<td>0.260</td>
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<td>0.180</td>
<td>0.080</td>
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<td>KVX 61-1</td>
<td>0.167</td>
<td>0.556</td>
<td>0.321</td>
<td>0.500</td>
<td>0.597</td>
<td>1.028</td>
</tr>
<tr>
<td>KVX 745-11P</td>
<td></td>
<td>0.335</td>
<td>0.078</td>
<td>0.443</td>
<td>0.516</td>
<td>1.142</td>
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<tr>
<td>KVX 421-2J</td>
<td>0.044</td>
<td></td>
<td>0.175</td>
<td>0.100</td>
<td></td>
<td>0.280</td>
</tr>
<tr>
<td>IT 98K-205-8</td>
<td>0.275</td>
<td>0.125</td>
<td>0.109</td>
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<td></td>
<td>0.449</td>
</tr>
<tr>
<td>Mélakh</td>
<td>0.128</td>
<td>0.150</td>
<td>0.282</td>
<td></td>
<td></td>
<td>0.150</td>
</tr>
<tr>
<td>KVX442-3-25</td>
<td>0.058</td>
<td>0.033</td>
<td></td>
<td></td>
<td>0.614</td>
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<tr>
<td>KVX775-33-2</td>
<td>0.105</td>
<td>0.065</td>
<td>0.042</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>KVX775-3-10</td>
<td>0.040</td>
<td>0.026</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>TOTAL</td>
<td>0.509</td>
<td>1.870</td>
<td>1.442</td>
<td>2.763</td>
<td>2.858</td>
<td>6.136</td>
</tr>
</tbody>
</table>

SOURCE: INERA, 2011
Foundation Seed Production

- **INERA**
  - On-station
  - Contracts
    - Farmers Groups
    - Individual Farmers
      - Minimum 3 ha
    - Private companies
      - e.g. Faso Agricultural Neema (NAFASO)

Foundation Seed, off-season – Bagre

Foundation Seed, new KVx 421-2J – Pobe
<table>
<thead>
<tr>
<th>Years Varieties</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>KVX 396-4-5-2-D</td>
<td>921</td>
<td>800</td>
<td>2761</td>
<td>2086</td>
<td>1857</td>
<td>4182</td>
<td>7650</td>
<td>14227</td>
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<tr>
<td>KVX 396-4-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>585</td>
<td>669</td>
<td>1596</td>
<td>4376</td>
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<tr>
<td>KVX 414-22-2</td>
<td>1626</td>
<td>625</td>
<td>1505</td>
<td>317</td>
<td>510</td>
<td>220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KVX 61-1</td>
<td>1411</td>
<td>570</td>
<td>2534</td>
<td>3420</td>
<td>1598</td>
<td>5986</td>
<td>14681</td>
<td>27247</td>
</tr>
<tr>
<td>KVX 745-11P</td>
<td>1100</td>
<td>400</td>
<td>1678</td>
<td>7340</td>
<td>2434</td>
<td>2222</td>
<td>3297</td>
<td>11910</td>
</tr>
<tr>
<td>KVX 421-2J</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>130</td>
<td>380</td>
<td>950</td>
<td></td>
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<tr>
<td>Gorom local</td>
<td>210</td>
<td>522</td>
<td>85</td>
<td>270</td>
<td>488</td>
<td>1150</td>
<td></td>
<td></td>
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<tr>
<td>IT 98K-205-8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>225</td>
<td>180</td>
<td>182</td>
<td>1766</td>
</tr>
<tr>
<td>Mélakh</td>
<td>187</td>
<td>110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1871</td>
<td></td>
</tr>
<tr>
<td>KVX775-33-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>80</td>
<td>375</td>
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</tbody>
</table>
Certified Seeds Production

• Seed certification
  – conducted by SNS (Foundation and Certified)
  – quality controls on the farm and in the laboratory.

• Producers of Certified Seed
  – > 50 Farmers organizations
    • Womens’ Groups
    – Individual farmers

• Buyers
  – Government
  – FAO
  – Individuals
  – Burkina Faso Union of Seeds Farmers (UNPS-BF)
  – NGOs
Production of Certified Cowpea Seed in Burkina Faso

SOURCE: NATIONAL SERVICE OF SEED (SNS), 2011
Training

- Farmers
  - >1/3 women

- Technicians
  - NGO’s
  - National Institutions
  - Farmer’s organization
  - Individual farmers
Senegal

Yacine Breeder Seed Production Field - Bambey
Cowpea Production and Seed Needs

- Cowpea area: 200,000 ha (sole cropped)
- Total annual need:
  - 3200 T Certified
  - 1066 T Foundation
- Availability of Foundation Seed identified as a bottleneck for adequate supply of seed
- Certified Seed production by diverse actors
Strategies

• Foundation from Breeder seeds:
  – 1\textsuperscript{st} generation: ISRA seed unit, complemented by breeding program
  – 2\textsuperscript{nd} generation: Farmer organizations

• Work with the national Extension Service (ANCAR) and farmers organizations

• Farmers trained in seed production, harvest and post-harvest
‘Melakh’ Foundation Seed Field
ISRA/CNRA Bambey
Organizations involved in Certified and Foundation Seed Production

• Farmers organizations:
  – UGPM
    • 5000 members
    • 61% of women and 49% men.
  – RESOPP: Farmers cooperatives organized by the NGO EWA
    • 6000 members
  – Millenium village projects: 1343 members
  – Touba Toul ‘cooperative’: 3056 members
    • 55% women
Seed Producer Training

• Training of farmers for seed production
  ✓ Field selection, culling
    ▪ Removing off-types and diseased plants,
  ✓ Harvest and post-harvest handling
    ▪ Double bags provided to farmers for storage
2011 Foundation Seed

- ISRA: 7.2 T
- NGO-RESOPP: 2.1 T
- Moustapha Diop: 3.4 T
- ARSM: 2.1 T
- UGPM: 1.7 T
Foundation Seed Production

• 2009: 11.254 T
  – 32% of annual need

• 2010: 23.5 T
  – 67% of annual need

• 2011: 16.5 T
  – 47% of annual need
Regionalization into Mali and Niger

From Senegal and Burkina Faso


Mali, 2 year means (low Striga emergence)

<table>
<thead>
<tr>
<th>Genotypes</th>
<th>50%</th>
<th>Maturity</th>
<th>Striga emerged</th>
<th>Grain yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOURIDE</td>
<td>69</td>
<td>1</td>
<td>1</td>
<td>979</td>
</tr>
<tr>
<td>BJIGUIYA</td>
<td>67</td>
<td>0</td>
<td>0</td>
<td>864</td>
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<tr>
<td>KOROBALEN</td>
<td>72</td>
<td>0</td>
<td>1187</td>
<td></td>
</tr>
<tr>
<td>KVX-421-25</td>
<td>74</td>
<td>0</td>
<td>1292</td>
<td></td>
</tr>
<tr>
<td>YACINE</td>
<td>66</td>
<td>0</td>
<td>708</td>
<td></td>
</tr>
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</table>

KVx-421-25 from Burkina Faso Program produced the highest yields

Data courtesy Mamadou Toure, Mali, 2010 and 2011
## Yield of CRSP varieties in Niger 2010 and 2011 (no-spray)

<table>
<thead>
<tr>
<th>Variety</th>
<th>Origin</th>
<th>Yield (T/ha)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>2010</td>
<td>2011</td>
</tr>
<tr>
<td>KVX 912-2P2 (INERA)</td>
<td>Burkina</td>
<td>1624 ef</td>
<td>510 ab</td>
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<tr>
<td>KVX 907-2P2 (INERA)</td>
<td>Burkina</td>
<td>1749 ef</td>
<td>765 b</td>
<td></td>
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<tr>
<td>KVX 912-1P1 (INERA)</td>
<td>Burkina</td>
<td>249 a</td>
<td>270 ab</td>
<td></td>
</tr>
<tr>
<td>Melakh (ISRA)</td>
<td>Senegal</td>
<td>1208 b-f</td>
<td>495 ab</td>
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<tr>
<td>KVX 404-8-1 (INERA)</td>
<td>Burkina</td>
<td>1562 d-f</td>
<td>497 ab</td>
<td></td>
</tr>
<tr>
<td>KVX 414-22-2 (INERA)</td>
<td>Burkina</td>
<td>1604 ef</td>
<td>575 ab</td>
<td></td>
</tr>
<tr>
<td>KVX 421-25 (INERA)</td>
<td>Burkina</td>
<td>791a-c</td>
<td>62 a</td>
<td></td>
</tr>
<tr>
<td>IT98K-1111-1 (IITA)</td>
<td>IITA</td>
<td>333 a</td>
<td>210 a</td>
<td></td>
</tr>
<tr>
<td>Pakau (new from ISRA)</td>
<td>Senegal</td>
<td>1854 f</td>
<td>462 ab</td>
<td></td>
</tr>
<tr>
<td>Mouride (ISRA)</td>
<td>Senegal</td>
<td>1479 c-f</td>
<td>265 ab</td>
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</tr>
<tr>
<td>TN 5-78 (INRAN)</td>
<td>Niger</td>
<td>1020b-e</td>
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<td>90 a</td>
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<td>TN 256-87 (INRAN)</td>
<td>Niger</td>
<td>499 ab</td>
<td>310 ab</td>
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</table>

Data courtesy Ibrahim Baoua, INRAN
Cowpea Seed Production and Delivery in Senegal

• Focus on CRSP varieties ‘Melakh’ and ‘Yacine’
• Breeder seed 0.5 ha each to support.
• Foundation seed 1,378 and 1,113 Kg by ISRA
• Certified Seed >16,000 Kg produced in 2009 at 3 locations by NGO-EWA, farmers’ union UGPM, and Producers Professional Training Center (CPFP).
• Groups include men and women farmers.
• Phase II expansion with Supplemental Funds